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Historical Issues in Sleep Medicine

Johann Christian August Heinroth on sleep deprivation as a therapeutic option for depressive disorders

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ABSTRACT

Partial or total therapeutic sleep deprivation leads to an immediate and far-reaching release of depressive symptoms in about 60% of patients with depressive disturbances. It is for that reason that this therapeutic option is offered and studied in many psychiatric clinics. Several papers have acclaimed the German psychiatrist Johann Christian August Heinroth (1773–1843) – the first university professor of psychiatry – as a pioneer of this therapeutic approach. However, no reference has been made specifying where in his comprehensive oeuvre he promoted this notion, nor has any analysis of the texts or passages in question been delivered. This study demonstrates that Heinroth indeed understood the existence of numerous close bidirectional relationships between mental disorders and sleep, above all, disorders of the latter. Consequently, he explicitly recommended sleep deprivation as a therapy for "melancholia," the contemporary name for depressive disorders. This finding is of apparent relevance to the history of psychiatry and sleep medicine. One should nonetheless bear in mind that the passages summarized below are scattered throughout Heinroth's famous Textbook of Psychiatry of 1818 and other works, and that Heinroth never elaborated on this issue systematically. Moreover, his statements promote the impression that they were the result of vague impressions and thoughts, and that Heinroth did not benefit from extensive experience. Yet what is important to note is that he regarded sleep deprivation as a feasible treatment option only for patients whose depression had recently been diagnosed.

1. Heinroth as a pioneer of sleep deprivation in the treatment of depressions

The interrelations of mental disturbances and sleep are currently the subject of much research. From manifold perspectives, and against the background of varying hypotheses, single biological or psychological mechanisms and general patterns are being elaborated. There is no denying that sleep can play a significant role in the emergence, course, and therapy of several mental disturbances; it is equally evident that an ill mind has an impact on sleep and its quality. This knowledge has grown over the course of human history.

Clinical evidence has been increasingly produced for the efficiency of sleep deprivation in a wide range of depressive symptoms. Hence this therapeutic approach has become a supporting option accompanying other psychiatric treatments [1]. For example, bipolar depressions that do not respond well to antidepressive medication have been shown to benefit from the antidepressive effects of sleep deprivation [2]. Yet the idea that sleep deprivation has a therapeutic impact in the treatment of depressive disorders is by no means new. Throughout the history of psychiatry, allusions have been made to this line of thought; sometimes it was explicitly expressed or even clinically applied. This clinical application is usually associated with studies by the German psychiatrists Schulte, Pflug and Tölle published in the period from 1959 until the 1970s [3–7]. Yet the idea dates from much further back, namely to the first half of the 19th century and to Johann Christian August Heinroth (1773–1843), as has previously been highlighted [8–11]. The first western professor of psychiatry has even been referred to as the "pioneer of the clinical application" of sleep deprivation for depressive patients – at least for German psychiatry [12].

This study is the first to thoroughly search Heinroth's extensive oeuvre thoroughly for relevant passages and to elaborate his position on sleep and sleep deprivation as closely as possible on the basis of original texts. Heinroth's *Lehrbuch der Störungen des Seelenlebens oder der Seelenstörungen und ihrer Behandlung* [13] – the first comprehensive German psychiatric compendium and at the same time the best-known of his 45 books – proved most instructive with regard to our topic (Fig. 1).

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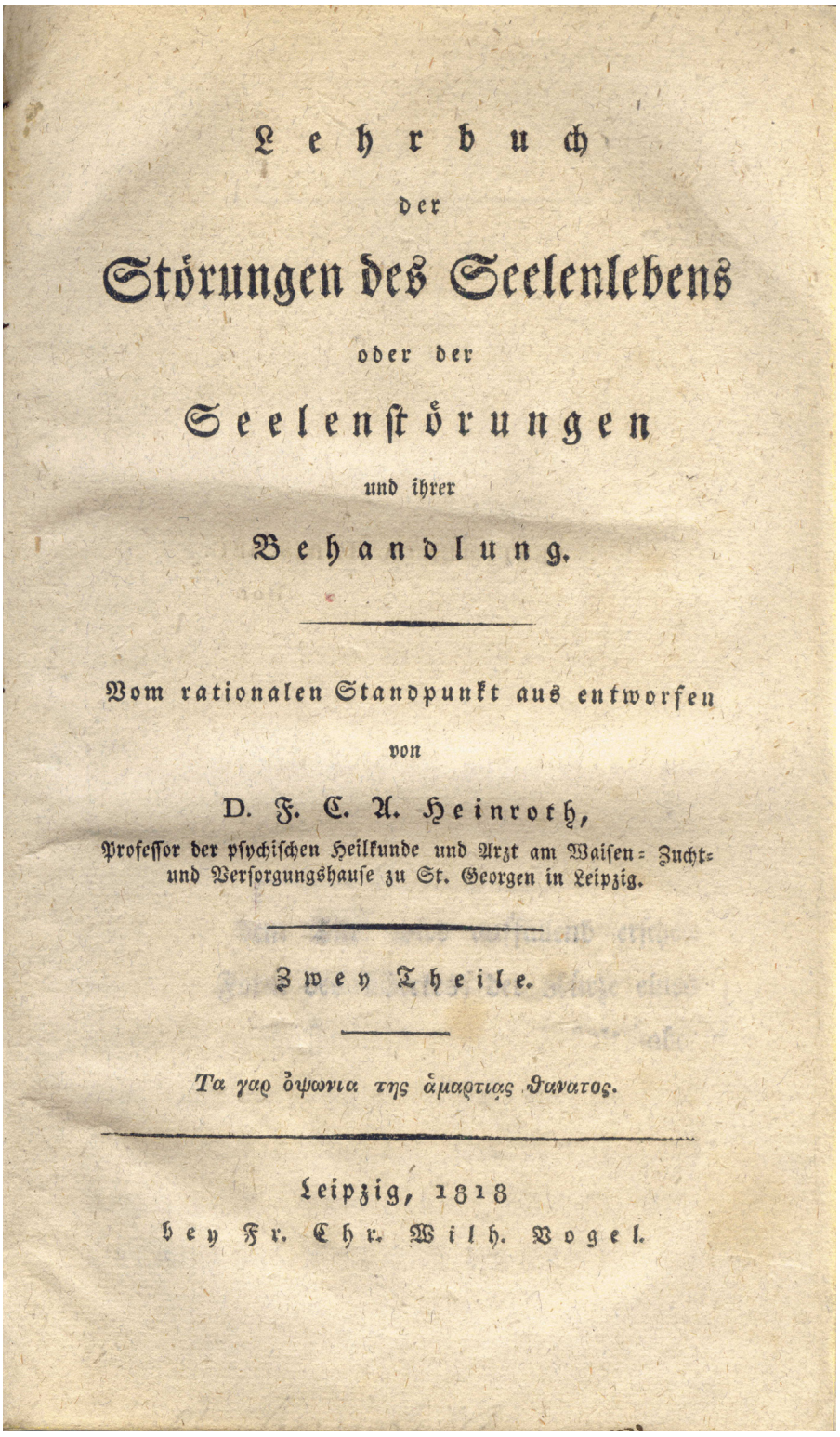


Lehrbuch
der
Störungen des Seelenlebens
oder der
Seelenstörungen
und ihrer
Behandlung.

Vom rationalen Standpunkt aus entworfen
von
D. F. C. A. Heinroth,
Professor der psychischen Heilkunde und Arzt am Waisen- Zucht- und Versorgungshause zu St. Georgen in Leipzig.

Zwey Theile.

Τα γαρ ὀψωνια της ἁμαρτιας θανατος.

Leipzig, 1818
bey Fr. Chr. Wilh. Vogel.

Fig. 1. Title page of the two-volume *Textbook of the Disturbances of the Soul's Life or Mental Disorders and Their Treatment* by Johann Christian August Heinroth published in 1818. It is acknowledged as one of the first comprehensive psychiatric textbooks in the world. The book features several passages on the interrelationships between sleep (and its disorders) and mental disturbances.

2. Johann Christian August Heinroth

Let us begin with the man himself. Heinroth was one of the most prominent people in international psychiatry during the first half of the 19th century.

Born on 17 January 1773 in Leipzig, Saxony, as the son of a doctor, he studied medicine at the local university [on his biography see mainly 14]. His decision to do so is seen as a tribute to his father; it certainly came as a surprise to many. Heinroth had been expected to take theology, which was where he himself had seen his

actual calling. His family soon began to think that as a doctor he would not succeed in his profession; indeed he did take on theological studies in 1805 at the age of 32 years. He soon saw himself compelled to abandon theology, however, since leaving his job in order to study meant that he did not have any income or other financial means. Heinroth ultimately found consolation by taking theology into medicine and specializing in illnesses that he judged to be related to the soul. This meant that he could be a doctor and also pursue his pastoral passion. Heinroth's entire concept of mental health and illness was determined by his Christian faith and could be understood as a theopsychiatric symbiosis.

Heinroth remained famous in the history of medicine and psychiatry due to his ideas in this regard, which have been misjudged to his disadvantage by his successors who followed a biological approach [15,16]. According to his concept, any disturbance of the soul – a term which he applied to what became accepted as endogenous mental disease – was caused by the patient having committed "sin." "Sin" did not mean a single reprehensible act, e.g. the violation of biblical commandments, but rather an abandonment of God in general, a lifestyle that was "wrong," as it sought to satisfy earthly, self-centred needs and passions, pursuing instead a life that contradicted the divine plan and ethics. If a human being submits to an increasing number of earthly passions and temptations, that individual's will can no longer be free, but will instead be restricted. This will result in the loss of control over oneself and one's way of life; the individual will be misled and will ultimately fall prey to a mental disorder. Prior to acquiring mental disorders, each individual has the freedom to choose his or her own way of life, and with it the power over and key to mental health or illness. It is this concept of sin and the notion that falling prey to mental illness is a person's own fault [17,18] that had caused Heinroth and his work to attract harsh criticism. However, this concept of responsibility for one's own actions becomes much less deterring if the religious interpretation is merely replaced with one that is more along the lines of general mental hygiene, that is that an individual does in fact bear responsibility for protecting and maintaining his or her own mental health and should pursue an appropriate lifestyle to this end. As a typical representative of Romanticist medicine, Heinroth followed an anthropological holistic medical approach to the human being. Hence, he was not primarily concerned with removing individual illness symptoms, but rather with the whole person, including that person's living conditions and way of life, since returning to a state of health meant that a "wrong" lifestyle needed to be corrected and steered back towards the divine plan. In some respects, therefore, his ideas for a "direct mental method" ("*direct-psychische Methode*") were similar to basic assumptions of modern psychotherapy and featured aspects of today's cognitive, behavioural, and interview therapy [13,19].

As was recently elaborated, it was Heinroth who introduced the term "psychosomatic" into international medical literature [20,21]. Coincidentally, this occurred while he was discussing the possible causes for sleeplessness in his textbook of 1818, stating that there can be purely mental causes or purely physical causes, but also "psychosomatic" causes ("*psychisch-somatisch*"), i.e. causes that were mental and somatic in nature to the same degree. (The German *psychisch-somatisch* is a sequence of two adjectives and would literarily have to be translated as "mental-somatic.") The second use of this newly coined term occurred in the description of melancholia, where Heinroth stated that "in most cases" melancholia had "deep . . . psychosomatic roots" [13, vol. 2, pp. 49, 222]. However, even if he used this prototype for the subsequent term "psychosomatic" only twice in all his 45 books, his entire holistic medical concept includes many interrelations between the body and the soul.

On the other hand, Heinroth used the word "depression" in a new, psychiatric sense. He viewed depression not as a physiological state of low pressure in the vessels and in the brain, which was how the term had been used in medicine for a long time, but as a pathologically under-excited or depressed state of mind. He thus used the word to characterize melancholia as a depressed state of mood/mind. Although he never used the word 'depression' as the name of a single illness or group of disorders, he undeniably laid the foundations for this later use [22]. Moreover, his 1818 textbook clearly characterizes "circular mania" (manic–depressive disorder) as one single bipolar entity, as it were, refusing the notion that this was a change of two independent states, or illnesses, namely mania and depression [22]. Closer inspection also reveals that he was also one of the first to elaborate mixed states of manic–depressive disorder and schizoaffective disorder [23].

Fig. 2. Johann Christian August Heinroth. Lithography by C. Lutherer. Source: Universitätsbibliothek Leipzig, Sondersammlungen.

Heinroth furthermore occupies a prominent position in the institutional history of psychiatry. It was for him that on 21 October 1811 the first professorship of psychiatry was opened at a western university, namely at the University of Leipzig, where Heinroth was appointed associate professor of "mental therapy" [24–26]. He was later also appointed fellow professor of medicine in 1819, until his death on 26 October 1843 (Fig. 2).

3. Heinroth's views on mental disorders and sleep

An analysis of Heinroth's 45-monograph oeuvre for general statements on the relationships between mental disorders and sleep provides support for the assertion that he was fully aware that in particular between disorders of sleep and mental disorders there are manifold bidirectional connections. In the first volume of his *Lehrbuch der Seelengesundheitskunde* (Textbook of Mental Health) we find a lengthy chapter "On Sleep and Its Benefits" and, later, a chapter "On the Right Measure of Sleep" [27, vol. 1, pp. 413–28, 506–10]. In these passages, Heinroth gives his views on the physiology and phenomenology of sleep and elucidates his theory on the sense of dreams. Yet it is primarily his recommendations on sleep hygiene that prove highly innovative.

In several places we find evidence of Heinroth's conviction that disturbances of sleep or the suppression of a person's need to sleep can constitute a major cause of an "ill soul mood" [e.g. 27, vol. 1, pp. 424–5; 28, p. 101]. Yet disturbed sleep and its impact on the emergence of mental disorders are always embedded within his

more comprehensive theopsychiatric approach to etiopathogenesis, which states that it is a person's refusal to follow the "divine plan of creation within the human being at the fault of the human being" [13, vol. 1, p. 34], i.e. a misled quest for the satisfaction of one's urges, that makes a human being unhappy, dissatisfied, ill-tempered, and depressed, ultimately affecting the body, including one's sleep [29, p. 87]. In a state of "ill human passion," a person loses freedom and inner peace [13, vol. 1, pp. 26–7]. Consequently, this will lead to mental diseases, during which the sleeping disorder may continue. This connection may also be observed in melancholia, in which the urge to brood over a "fixed idea" (mental inhibition, rumination) can prevent sleep and hence maintain the melancholic state or the melancholic state prevent the patient from sleeping. The psychiatrist's role is to ensure the patient's return to sound sleep. To reach this aim Heinroth recommends a range of methods to increase excitation [13, vol. 2, pp. 112–6, 138].

Heinroth nonetheless speculates on whether sleeplessness could have its own natural sense, or inborn natural healing capacity – especially during acute phases. Hence, the author continues, it might not always be the wisest thing to do to fight sleeplessness and with it prevent a therapeutic process:

> "Do we always know what we demand from ourselves and from nature if we strive to abolish sleeplessness? It is true: in the long run, it is exhausting and a drain on strength and even organs, resulting in the deterioration of the patient's overall state, driving the ill state to its peak. Yet who knows whether this deterioration and maximum tension of the pathogenic state is not the trigger for relaxation and the return to a normal state? Experience has shown that sleeplessness has taken the most severe mania and similar states from their peak to a state of relaxation, rest, and even sleep. Forcing maniacs to relax or to slumber would, it follows, be more disadvantageous than depriving sleep. Hence there are cases in which it is better not to remove stimuli that cause sleeplessness, but rather to tolerate it [i.e. this sleeplessness] and keep a close eye on its effects" [13, vol. 2, p. 50].

4. Heinroth on sleeplessness and sleep deprivation in depressive disorders

The third section of his *Textbook of the Disturbances of the Soul's Life* from 1818 deals with the "Techniques," i.e. the therapeutic options for treating mental diseases. The section opens with an introductory chapter on "Heuristics," i.e. the teaching of how to find and apply remedies. In this chapter, Heinroth writes about physical states that are typical of chronically mentally ill patients, coincidentally beginning with sleeplessness. He considers it essential that a doctor concentrate on the removal of such ill states, while never forgetting that the removal of such physical states and hence physical treatment would be nothing more than a "somatic auxiliary therapy" [13, vol. 2, p. 48], for it is incapable of changing the "wrongness" of the lives led by the patients.

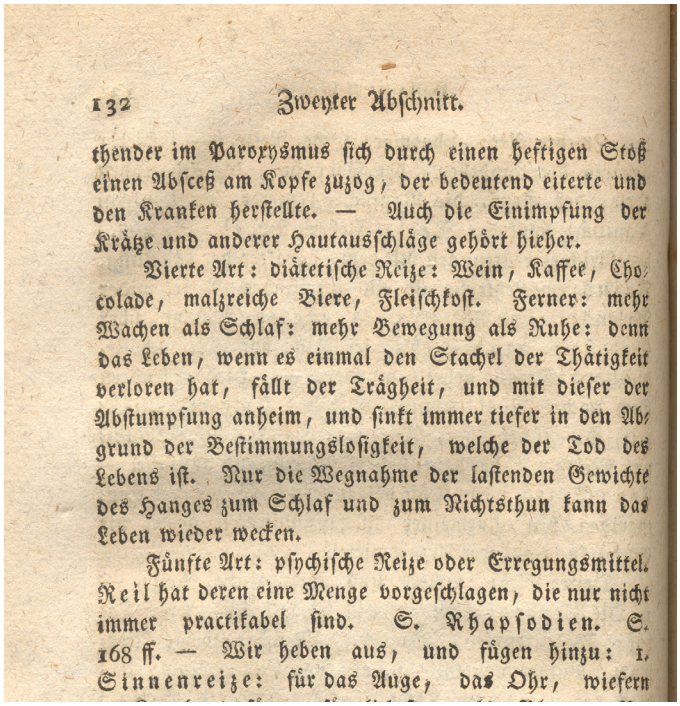
In the introduction to the chapter on sleeplessness, Heinroth agrees with findings made by ancient medicine, stating that "indeed sleeplessness is chiefly maintained by pathological excitation" [13, vol. 2, p. 49]. Quite what Heinroth understood by "pathological excitation" here is not explained; we do not know whether he explicitly referred to affective excitation or to a high neurophysiologic level of attention, alertness and responsiveness, and hence to something corresponding to present-day vigilance or brain arousal – or rather to mental illness in general. From the context, the latter is more probable, for, in general, Romanticist medicine followed the notion that there is a generally accepted imaginary zero level of excitement, from which either excessive or defective (decreased) levels vary and constitute the cause for illness (so-called Brunonian principle in medicine, named after John Brown). This model was also a general guiding principle for Heinroth, which explains his frequent use of the term "excitation."

As for sleeplessness and its causes, Heinroth writes: "It does not suffice to search for its manifold causes, despite the necessity to do so, for without establishing the right cause it cannot be abolished; one must also look at its effects and consequences. Indeed, despite their disadvantages, these consequences can also have a healing effect, and it is by way of these considerations that the right treatment option is to be decided upon" [13, vol. 2, p. 49]. Heinroth does not diverge from the path taken by his colleagues of the time and he deals with remedies against sleeplessness in three pages of his book [13, vol. 2, pp. 152–4]. The lines quoted above make it clear, however, that Heinroth not only saw the removal of sleeplessness as a therapeutic option to treat the mentally ill; he also considered sleeplessness as such to be an option, and as having healing and supporting potential.

Heinroth further states that each therapy must be an "individual treatment" – today the terms 'individualized' or 'personalized' would be used – which forms the "fourth aspect" of his heuristic approach. Here he says that sleep deprivation as a therapeutic option should be applied if suggested by the individual patient and his or her state of illness. This is remarkable, for in stating this Heinroth departs from his usual standpoint of mere speculation and demands a clearly empirical approach. We can thus assume from the quotation above that Heinroth favoured sleep deprivation as a sedating therapy for manic and psychotic disorders, which would stand in line with what colleagues stated and practised, for we know of several contemporary doctors who applied sleep deprivation generously and even as a repressing measure. In another context Heinroth explicitly described sleep deprivation as a "mental sedative in cases of excitation," in particular recommending "sleep deprivation for patients who became even more excited after having slept, but becoming tired and compliant after being forced to stay awake; a remedy which could be perceived as harsh, but which in fact works to the benefit of the patient. They are awakened from time to time, whenever they are about to fall asleep" [13, vol. 2, pp. 114–5]. The question, however, is whether Heinroth views sleep deprivation as being restricted to those disorders.

A careful analysis of the therapy section can be found in paragraph 344 under "Remedies increasing diminished excitation" or "exciting or agitating remedies." These, Heinroth says, "are good for any kind of depression, even if used in different ways and intensities" [13, vol. 2, p. 129]. Here one should take into consideration the fact that Heinroth was deeply convinced of the teaching of the so-called psychological capabilities, according to which human strength stems from three different spheres: from the ability to recognize (mind/reason), to desire (will), and to feel (mood/temper/emotions). When a person becomes mentally ill, each of these spheres can be affected – i.e. unduly aroused or excited (exaltation) or diminished (depression) – either individually or in combination with the others. According to this basic theory, Heinroth differentiated between three "pure" kinds of depression, where only one capability was affected: diminished mental excitation (idiocy), diminished will (indecision or aboulomania), and diminished excitation of the mood (melancholia). Against this background all statements in paragraph 344 mentioned above on arousing or "exciting or agitating remedies" are to be understood as relevant for idiocy, indecision, and melancholia together, not restricted to those disorders which are today categorized as depressive disturbances. Yet it is significant that these statements are also to be understood as relevant for depressions. Present-day depressions are largely identical to Heinroth's melancholies (only bipolar affective disorders are not covered by the thoughts above, for according to his category these were among the "mixed mental disorders").

The main result for our study is that at no time did Heinroth exclude what we refer to today as depressive disorders; on the



132 Zweyter Abſchnitt.

thender im Paroxysmus ſich durch einen heftigen Stoß einen Abſceß am Kopfe zuzog, der bedeutend eiterte und den Kranken herſtellte. — Auch die Einimpfung der Krätze und anderer Hautausſchläge gehört hieher.

Vierte Art: diätetiſche Reize: Wein, Kaffee, Chocolade, malzreiche Biere, Fleiſchkoſt. Ferner: mehr Wachen als Schlaf: mehr Bewegung als Ruhe: denn das Leben, wenn es einmal den Stachel der Thätigkeit verloren hat, fällt der Trägheit, und mit dieſer der Abſtumpfung anheim, und ſinkt immer tiefer in den Abgrund der Beſtimmungsloſigkeit, welche der Tod des Lebens iſt. Nur die Wegnahme der laſtenden Gewichte des Hanges zum Schlaf und zum Nichtsthun kann das Leben wieder wecken.

Fünfte Art: pſychiſche Reize oder Erregungsmittel. Reil hat deren eine Menge vorgeſchlagen, die nur nicht immer practikabel ſind. S. Rhapſodien. S. 168 ff. — Wir heben aus, und fügen hinzu: 1. Sinnenreize: für das Auge, das Ohr, wiefern

Fig. 3. Original German passage from Volume II of Heinroth's 1818 *Textbook of the Disturbances of the Soul's Life or Mental Disorders* (p. 132). Seen in context, Heinroth here supports the notion of sleep deprivation as a remedy for melancholiae (depression).

contrary, he did have them in mind, for in several passages, most prominently in the chapter on "general melancholia," he wrote: "If it is to be treated, such treatment is only feasible and possible at the beginning of the illness and in treating it, all exciting (§344), stimulating (§345) and encouraging (§346) remedies are to be applied. Regardless of these, in most cases all efforts will be in vain, mainly because of the deep mental, psycho-somatic roots of this evil" [13, vol. 2, p. 222].

Paragraph 344 on arousing and "agitating remedies" is subdivided into five "types" of "stimuli," the fourth of them being "dietary" remedies. These include "wine, coffee, chocolate, beers rich in malt, meat and also being awake more than asleep, moving more than resting or remaining at ease," which Heinroth substantiates by asserting that "once life has lost its drive to be active, it will fall prey to inactivity, idleness and hence to dulling and hebetudes and from there will sink deeper and deeper into a state of purposelessness, which is equal to death itself. Only removing this tendency to sleep and to remain idle can revive life" [13, vol. 2, p. 132] (Fig. 3). In summary, Heinroth did indeed recommend sleep deprivation as a therapeutic approach to what we today classify as depressive disorders. However, one should bear in mind Heinroth's reservation that only recent cases of depression had moderate potential of responding successfully to therapy.

It therefore remains an open topic of discussion whether, as some authors have suggested, Heinroth indeed applied sleep deprivation as a sedative [30] or as a therapy in treating depression clinically [12]. It appears somewhat doubtful and one is inclined to follow the interpretation of one of the forefathers of modern clinical psychiatry, Emil Kraepelin (1856–1926), who concluded that Heinroth had not applied this approach on a noteworthy scale [16]. Given that we have identified all relevant passages in his major oeuvre, his few and rather scattered statements on sleeplessness and sleep deprivation imply rather that he only had vague ideas about it or was even reproducing thoughts and observations given to him or of colleagues, and that everything remained within an abstract, academic framework. Moreover, we have previously demonstrated that Heinroth never worked in a psychiatric hospital (they did not exist at the time) and had seen mentally ill people only in his function as visiting doctor to the combined orphanage, penitentiary and nursing home in Leipzig, the visits being of short duration and the treatment administered by him being minimal [31].

5. Heinroth's remarks against the background of modern hypotheses

Though Heinroth's remarks on sleep deprivation as a remedy for depressive disorders are notable from a medico-historical perspective, great care should be exercised when comparing them with the modern therapeutic approach. Besides the account given above, it is principally the lack of explicitness and profoundness of these singular, unconnected remarks that should caution us against drawing direct parallels with present-day findings and theories. On this basis, Heinroth can hardly be acknowledged as a "pioneer" of any particular approach; doing so would result from an ahistoric overinterpretation of the material available.

Today it is well established that depressions are accompanied by sleep disturbances such as prolonged sleep onset latency, early wake-up, and decreased rapid eye movement sleep latency [32,33]. In several larger follow-up studies, sleep disturbances have been shown to precede later depressive disorders [34,35]. Yet it is still a matter of debate as to whether these sleep disturbances are causal for depressions or rather an expression of pathological dysregulations of wakefulness that cause both the sleep disturbances and depressions. Nonetheless enough evidence has been produced for the effects and efficiency of sleep deprivation, even though the working principle behind it is unclear. For example, chronobiological mechanisms have been discussed [1]. Within the vigilance regulation model of depressive disorders it is the strengthening of sleep-promoting and the weakening of vigilance-promoting neurochemical processes by increasing the homoeostatic sleep pressure that make up the therapeutic effect of sleep deprivation [36].

For Heinroth, sleep disorders and melancholia stood in a bidirectional interrelationship. Within his theopsychiatric concept, both generalized sleep disorder and melancholia are but symptoms of a causal pathological state, namely a fall away from the divine plan. In consequence, this is in perfect harmony with hermeneutic biographic concepts of illness that perceives mental illness as the result of a personal maldevelopment. By contrast, the present-day discussion on pathological dysregulation of wakefulness/vigilance as a possible cause of both depression and sleep disorders is based on a totally different scientific theory. This neurobiological scientific approach sees illnesses as natural entities or conditions. The only combining trait is that both today's model and Heinroth assume that there is a common process underlying the emergence of both sleep disorders and of melancholia/depression. This process, however, is by no means neurobiological in nature in Heinroth's concept. Today, partial sleep deprivation is applied as a supporting therapy in inpatient care of those with depressive disturbances in Germany and a number of other countries. Within this therapy, patients are awakened after midnight and stay awake for the rest of the night and for the whole of the following day. About 60% of patients have been shown to experience a significant improvement of their depressive symptoms as early as the following morning [37,38]. However, in most cases these symptoms returned after the patients slept the following night [39]. Nevertheless the fact that just one night of sleep deprivation may remove – albeit temporarily – a depressive state that has continued for several months proves to the patient that his state can be changed and cured. Moreover, a similar response to sleep deprivation can be regarded as confirming an established diagnosis of a depressive disorder. Sleep deprivation may be administered twice or three times a week. In Heinroth's works there

is no hint as to the possible result or outcome of sleep deprivation, which supports the notion that he himself never applied sleep deprivation.

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Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: http://dx.doi.org/10.1016/j.sleep.2014.03.027.

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